

REMARKS

In the last Office Action, the Examiner rejected claims 1, 7-13 and 15 under 35 U.S.C. §112, second paragraph, for indefiniteness. Claims 1, 7-13 and 15 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,471,570 to Minami et al. ("Minami"). Claims 2-6¹ were allowed by the Examiner.

Applicants and applicants' counsel note with appreciation the indication of allowable subject matter concerning claims 2-6. However, for the reasons noted below, applicants respectfully submit that amended claims 1, 7-13 and dependent claims 14, 15 also patentably distinguish from the prior art of record.

In accordance with the present response, original independent claim 1 has been amended to overcome the rejection under 35 U.S.C. §112, second paragraph, by removing the recitation "roulette-like motion" objected to by the Examiner

¹ In the Office Action, the Examiner also grouped claim 14 with the allowed claims. However, claim 14 depends on independent claim 7 which has been rejected under 35 U.S.C. §112, second paragraph, and under 35 U.S.C. §103(a) over Minami. During a telephone conference on June 29, 2004, the Examiner advised that claim 14 was inadvertently grouped with the allowed claims and that claim 14 remains rejected as set forth above for base claim 7.

and by reciting instead the specific structure of the driving unit (e.g., rotational shaft, first revolution shaft and second revolution shaft) which imparts the roulette-like motion. This specific structure of the driving unit is also recited in allowed independent claim 2. Likewise, independent claim 7 has been amended to replace "roulette-like motion" with the specific type of combined movements (e.g., rotation and revolving movements about different eccentric axes) which generate such motion. Claims 6-13 have also been amended to conform to the amendment to independent claim 7. A new abstract which more clearly reflects the invention to which the amended claims are directed has been substituted for the previously submitted abstract.

The foregoing amendment to the abstract and claims does not raise any new issues requiring consideration and/or a new search. Independent claims 1 and 7 have been amended to overcome the rejection under 35 U.S.C. §112, second paragraph, raised by the Examiner. The subject matter of amended claims 1 and 7 (e.g., the rotational shaft, the first revolution shaft and the second revolution shaft and the rotation and revolving movements of these shafts about different eccentric axes) has already been considered by the Examiner with respect to allowed independent claim 2 and deemed to be outside the scope of the prior art. Claims 6-13 have been amended only to

conform to the amendment to independent claim 7, and the previously submitted abstract has been substituted with a new abstract which more clearly reflects the invention to which the amended and allowed claims are directed. Thus, the amendment does not raise any new issues and places the application in condition for allowance or in better form for appeal. Accordingly, entry of the amendment is most respectfully requested.

Applicants respectfully request reconsideration of their application in light of the following discussion.

Rejection Under 35 U.S.C. §112, Second Paragraph

The Examiner rejected claims 1, 7-14 and 15 under 35 U.S.C. §112, second paragraph, for indefiniteness. The Examiner contends that "it is unclear what attributes are embraced by the term "roulette-like". Applicants respectfully disagree with the Examiner's contention.

Applicants respectfully submit that claims 1, 7-14 and 15 are in full compliance with the requirements of 35 U.S.C. §112, second paragraph, which, in relevant part, provides:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

The "distinctly claiming" requirement of 35 U.S.C. §112, second paragraph means that the claims must have a clear and definite meaning when construed in light of the complete patent document. Miles Laboratories, Inc. v. Shandon, Inc., 27 USPQ2d 1123, 1126 (Fed. Cir. 1993).

In this case, the specific movement defining the "roulette-like motion" of the polishing sheet is described on pg. 2, lines 10-12 and pg. 4, line 24 to pg. 5, lines 1-4 of the specification. Furthermore, Fig. 3 shows the specific structure of the drive unit (e.g., rotation and revolution shafts) which generate the "roulette-like motion." Accordingly, applicants respectfully submit that the language of claims 1, 7-14 and 15 "particularly points out and distinctly claims the subject matter which applicant regards as his invention", as required by 35 U.S.C. §112, second paragraph. When read in light of the complete patent document, as directed by the Court of Appeals for the Federal Circuit, the language of claims 1, 7-14 and 15 is without any ambiguity.

Nevertheless, in order to expedite prosecution, independent claims 1 and 7 have been amended herein as discussed above to delete the phrase "roulette-like" and to recite instead the specific structure of the driving unit (claim 1) and the rotation and revolving movements of these

shafts about different eccentric axes (claim 7) in a manner similarly recited in allowed independent claim 2.

In view of the foregoing, applicants respectfully submit that the rejection of claims 1, 7-14 and 15 under 35 U.S.C. §112, second paragraph, has been overcome and should be withdrawn.

Brief Summary of the Invention

The present invention is directed to an end face polishing device and to a method for polishing the end face of a workpiece.

As described in the specification (pgs. 1-2), conventional end face polishing devices have not been able to polish the end faces of workpieces with high efficiency and high polishing speed. For example, the conventional end face polishing devices have been unable to polish end faces of workpieces with an optimum polishing speed while ensuring a uniform wearing of a polishing sheet.

The present invention overcomes the drawbacks of the conventional art. Figs. 3-6 show an embodiment of an end face polishing device and method according to the present invention embodied in the claims. The end face polishing device has a polishing disc 10 for supporting a polishing sheet having a polishing surface. A driving unit having a first revolution

shaft 50 mounted for undergoing revolving movement about a first axis, a rotational shaft 80 mounted for undergoing rotation about a second axis eccentric from the first axis, and a second revolution shaft 300 mounted for undergoing revolving movement about a third axis eccentric from the second axis. The polishing sheet is connected to the first revolution shaft 50, the rotational shaft 80, and the second revolution shaft 300 of the driving unit for undergoing corresponding revolving and rotational movement therewith. A pressing unit presses a workpiece during revolving and rotational movement of the polishing sheet to bring an end face of the workpiece into pressure contact with the polishing surface so that the polishing surface lies in a plane parallel to the end face of the workpiece to thereby polish the end face of the workpiece. By this construction and method, the end face of the workpiece can be polished with high efficiency and at a higher speed as compared to the conventional art.

Traversal of Prior Art Rejection

Claims 1, 7-14 and 15 were rejected under 35 U.S.C. §103(a) as being unpatentable over Minami. Applicants respectfully traverse this rejection and submit that the teachings of Minami do not disclose or suggest the subject matter recited in amended claims 1, 7-14 and 15.

Amended independent claim 1 is directed to an end face polishing device and requires a driving unit having a first revolution shaft mounted for undergoing revolving movement about a first axis, a rotational shaft mounted for undergoing rotation about a second axis eccentric from the first axis, and a second revolution shaft mounted for undergoing revolving movement about a third axis eccentric from the second axis, a polishing sheet having a polishing surface and connected to the first revolution shaft, the rotational shaft, and the second revolution shaft of the driving unit for undergoing corresponding revolving and rotational movement therewith, and a pressing unit for pressing a workpiece during revolving and rotational movement of the polishing sheet to bring an end face of the workpiece into pressure contact with the polishing surface so that the polishing surface lies in a plane parallel to the end face of the workpiece to thereby polish the end face of the workpiece. No corresponding structural combination is disclosed or suggested by the prior art of record.

Amended independent claim 7 is directed to a method for polishing an end face of a workpiece and requires the steps of providing a polishing sheet having a polishing surface and driving the polishing sheet to impart a preselected motion to the polishing sheet by imparting

revolving movement thereto about a first axis, imparting rotation thereto about a second axis eccentric from the first axis, and imparting revolving movement thereto about a third axis eccentric from the second axis. Amended claim 7 further requires the step of pressing a workpiece during driving of the polishing sheet to bring an end face of the workpiece into pressure contact with the polishing surface so that the polishing surface lies in a plane parallel to the end face of the workpiece to thereby polish the end face of the workpiece. No corresponding combination of steps is disclosed or suggested by the prior art of record.

Minami discloses an end surface polishing machine having a drive unit with a first rotational shaft that undergoes both rotation and revolving movement about different axes and a second rotational shaft which undergoes rotation about the revolution axis of the first shaft. The first and second shafts drive a polishing member to undergo rotational and revolving movement. Rod-shaped members are pressed against a surface of the polishing member during rotational and revolving movement thereof to polish the end faces of the rod-shaped members.

However, Minami does not disclose or suggest a polishing machine having the specific driving unit recited in amended independent claim 1. More specifically, amended claim

1 requires a driving unit having a first revolution shaft mounted for undergoing revolving movement about a first axis, a rotational shaft mounted for undergoing rotation about a second axis eccentric from the first axis, and a second revolution shaft mounted for undergoing revolving movement about a third axis eccentric from the second axis. In contrast, Minami only discloses one revolution shaft which corresponds to the first rotational shaft, that is, the first rotational shaft undergoes both rotation and revolving movement about two different axes. Furthermore, the second rotational shaft in Minami undergoes rotation about the revolution axis of the first rotational shaft. Thus Minami does not disclose or suggest a revolution shaft which undergoes revolving movement about a third axis eccentric from the axes of the first and second shafts, as required by amended independent claim 1.

Amended independent claim 7 recites the step of driving the polishing sheet to impart a preselected motion to the polishing sheet by imparting revolving movement thereto about a first axis, to impart rotation thereto about a second axis eccentric from the first axis, and to impart revolving movement thereto about a third axis eccentric from the second axis and, therefore, distinguishes from Minami for the same reasons set forth above for amended independent claim 1.

Claims 8-14 and 15 depend on and contain all of the limitations of amended independent claim 7 and, therefore, distinguish from Minami at least in the same manner as amended claim 7.

In view of the foregoing, applicants respectfully request that the rejection of claims 1, 7-14 and 15 under 35 U.S.C. §103(a) as being unpatentable over Minami be withdrawn.

The foregoing amendment to the abstract and claims does not raise any new issues requiring consideration and/or a new search. Independent claims 1 and 7 have been amended to overcome the rejection under 35 U.S.C. §112, second paragraph, raised by the Examiner. The subject matter of amended claims 1 and 7 (e.g., the rotational shaft, the first revolution shaft and the second revolution shaft and the rotation and revolving movements of these shafts about different eccentric axes) has already been considered by the Examiner with respect to allowed independent claim 2 and deemed to be outside the scope of the prior art. Claims 6-13 have been amended only to conform to the amendment to independent claim 7, and the previously submitted abstract has been substituted with a new abstract which more clearly reflects the invention to which the amended and allowed claims are directed. Thus, the amendment does not raise any new issues and places the

application in condition for allowance or in better form for appeal. Accordingly, entry of the amendment is most respectfully requested.

In view of the foregoing amendments and discussion, the application is believed to be in condition for allowance. Accordingly, entry of this amendment and favorable reconsideration and allowance of the claims are most respectfully requested.

Respectfully submitted,

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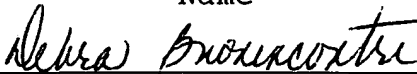
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